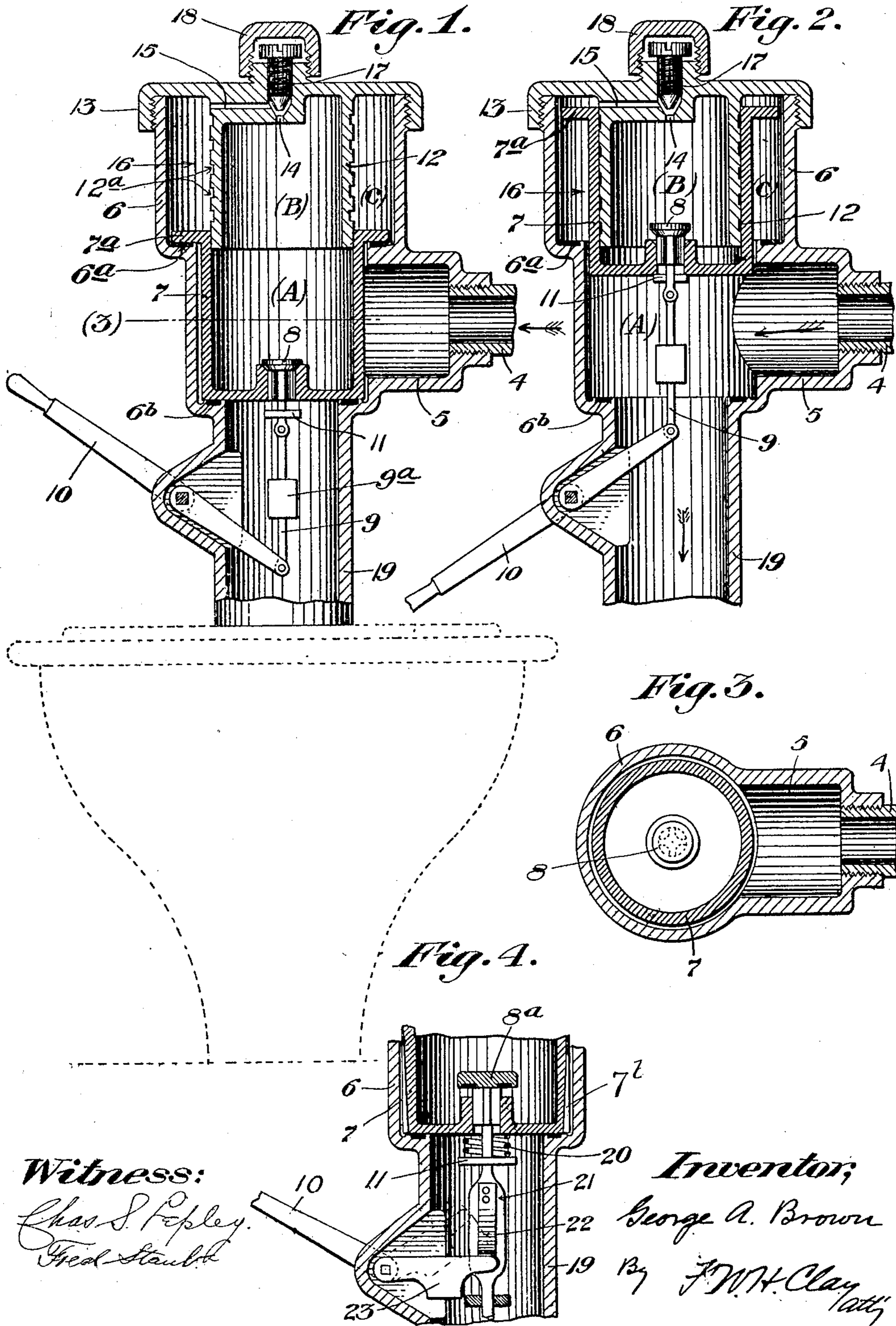


G. A. BROWN.
FLUSHING VALVE.

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913,097.

Patented Feb. 23, 1909.



Witness:

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Att'y

UNITED STATES PATENT OFFICE.

GEORGE A. BROWN, OF ALLEGHENY, PENNSYLVANIA, ASSIGNOR, BY DIRECT AND MESNE ASSIGNMENTS, OF ONE-THIRD TO JOSEPH P. BINGAMAN AND ONE-THIRD TO CHARLES F. BINGAMAN, BOTH OF PITTSBURG, PENNSYLVANIA.

FLUSHING-VALVE.

No. 913,097.

Specification of Letters Patent.

Patented Feb. 23, 1909.

Application filed May 13, 1907. Serial No. 373,241.

To all whom it may concern:

Be it known that I, GEORGE A. BROWN, a citizen of the United States, residing at Allegheny, in the State of Pennsylvania, have invented certain new and useful Improvements in Flushing-Valves, of which the following is a specification.

My invention relates to valves and is herein illustrated in its use as a flushing valve for water closets.

The principal objects of the invention are to provide means by which a closet may be flushed directly from the main and without the use of the customary storage tank; to provide a valve with automatic means to prevent its sudden closing; to make use of the vacuum principle for operating the valve; to simplify and cheapen the construction and generally to improve the operation of flushing valves. These objects and other advantages are attained by the construction illustrated in the accompanying drawing wherein—

Figures 1 and 2 are vertical sections through the valve and casing respectively, showing the valve closed and open. Fig. 3 is a horizontal section on the line 3 in Fig. 1. Fig. 4 is a detailed section showing a preferred form of the relief valve to cooperate with the main valve of Fig. 1.

It has heretofore been found difficult or impossible to use the water under heavy pressure direct from the main for flushing water closets, and this has been because of the difficulty of controlling the movements of the valve and preventing its opening too suddenly or chattering or closing too suddenly and successfully operating under changing conditions of the water. It has been customary therefore to use a storage tank and generally they have been emptied by siphons in order to get a limited amount of water and then to cause automatic stoppage of the flow. I have obviated such difficulties by use of a simple valve attached directly to the water pipe. Thus from the drawings it will be seen that the water pipe 4 is led directly into an enlarged expansion chamber 5 formed in the valve casing 6, and this opening is closed off from the closet by means of a large hollow cylindrical valve 7 seated in the casing 6 upon rubber gaskets 6 and 6^b, as shown in Fig. 1, and may be

provided with vertical grooves 7^b to allow more easy escape of the water, as shown in Fig. 4.

In the bottom of the hollow valve 7 there is a small opening closed by a relief valve 8, which is preferably made as in Fig. 4 at 8^a with a rubber gasket seat. The valve 8 normally is closed by the water and air pressure inside assisted in closing by a weight 9^a upon its link stem 9 or by a spring, as shown in Fig. 4. The link 9 is operated by any convenient handle 10, which will thrust upward the valve 8 until it is stopped by the collar 11. This will relieve the pressure of air and water that may be in the chambers A and B and the main valve 7 will now rise under balanced pressure, admitting water from the pipe 4 to flush the bowl.

The chamber B is formed by a hollow stem 12 which may conveniently be cast as part of the cap 13 of the casing 6. It has a snug fit within the valve 7 and is preferably provided with a series of annular grooves 12^a to form a water packing to make an air-tight joint against sudden movement as well as to prevent grinding by any dirt in the water. The chamber B is normally filled with air and for this reason the valve 7 is prevented from sudden rising but allowed to rise gradually. The air may escape through valve 8 and through the port 14 and by-pass 15 and is regulated by means of a screw 17 in the cap 13 which may be covered with a small cap 18 as shown. The seating flange 7^a of the valve 7 is of less diameter than the interior of the chamber C in the casing 6 so that when the valve rises the water or air may escape downward between the valve and casing;—the casing below also being larger than the valve 7 as shown. When the valve 7 is raised to its upper position, the pressure in chambers A, B and C, are practically equal and the valve will fall by gravity. When within a short distance of its seat and before its bottom makes contact with the annular shoulder 6^b or the flange 7^a comes in contact with 6^a, there is a throttling of the water passing downwardly from pipe 4 through conduit 19; the effect of the pressure of incoming water is to force itself upwardly through the annular passage between the shell of the valve and the casing and this will compress air in the chamber 16 and

chamber B, continuing to increase the pressure until the valve is finally seated. At the time the valve commences to fall and after valve 8 is closed, the enlarging of the chamber B will create a partial vacuum and meanwhile, since the outlet at 19 is larger than the inlet at 4 there will be free communication with the atmosphere through the bowl of the closet so that air will pass upwardly around the valve and some of it into the port 14. Both the suction inside the valve, and the resistance to throttling of the flushing stream, will prevent the valve from sudden closing, so that there is virtually either a positive or a negative air cushion against which the valve moves in both directions. This by experiment has been found to prevent water hammer.

In Fig. 4 I show a form of relief valve which I prefer, the valve stem 21 having a spring catch 22 which is engaged by the weighted lever 23 of the handle 10, and the length of the arm 23 is so arranged that when the handle is depressed the arm 23 moving in an arc may slide from under the catch 22 and thus release the stem of the relief valve even if the handle 10 be not at once lowered. The valve 8^a is then assisted in closing by its own weight or if preferred a spring 20 may be used. By this means the operation of the relief valve is rendered certain.

From the above description it will be evident that in operation the lowering of the handle 10 will first open the relief valve and then gradually raise the main valve and the bowl can be flushed as often or as long as desired. The movements of the main valve are under entire control by means of the by-pass 15 and regulating screw 17, and pressures are equalized by opening the relief valve. Both of its motions are controlled by air cushions which vary in pressure to correspond with the pressure in the water main. When the valve 7 begins to fall a partial vacuum is created in the chambers A, B, and this prevents the valve from dropping suddenly upon its seats 6^a and 6^b. While the invention has been described as for flushing valves for water closets, it will be evident that it may be also used as an ordinary cock without changing anything unless to provide a more convenient handle. It will be noted that this valve may be applied directly to the main so as to obviate the use of a storage tank and that it consists of but essentially two moving parts and no joints that can collect dirt. It is extremely cheap and takes up very little room, can be placed in any desired position and cannot get out of order. The valve has a gradual and easy movement in both directions and the device avoids the objectionable collection of stagnant water where tanks are used. No diaphragms or rubber parts are necessary and the valve

seats take care of themselves. Other advantages will readily occur to those familiar with the art.

Having thus described my invention and its use, what I claim as new and desire to secure by Letters Patent, is the following:

1. The combination of a casing having a side inlet, a relatively larger outlet below, and having a chamber above the inlet provided with a hollow guide stem, two valve seats of different diameter with the larger one above the inlet, a main valve nearly filling the casing and mounted on the guide stem to form an air-cushion for the valve, the same having a by-pass from the cushion chamber to the upper casing chamber and means to vent the air through the valve to allow the same to open.

2. A flushing valve comprising a casing with a hollow guide stem, an inlet and a relatively larger outlet, a hollow valve movable on the stem and practically filling the casing and practically closing the inlet and closing the outlet when seated, and means to relieve pressure in the valve to allow of its opening by water pressure.

3. A flushing valve comprising a casing with a hollow guide stem, an inlet and a relatively larger outlet, a hollow valve movable on the stem and practically filling the casing and practically closing the inlet and closing the outlet when seated, and means to relieve pressure in the valve to allow of its opening by water pressure and means to accumulate pressure behind it and close it when the relief opening is closed.

4. The combination of a casing having an inlet, an air-cushion chamber, a hollow stem and a hollow valve thereon having two seats in the casing but of slightly smaller diameter than the casing, means to relieve air-pressure in the closed valve on opening it and means to gradually admit pressure through the cushion chamber to the valve on closing it, substantially as described.

5. The combination of a casing having a middle valve chamber provided with a supply port leading thereto and a relatively larger discharge opening leading therefrom, a valve seat surrounding the discharge opening, a supplemental chamber beyond the valve chamber and having an intervening annular valve seat, an inwardly extending hollow guide stem above the seat, a port leading thereinto from the supplemental chamber, a hollow displacement valve engaging said guide movable within the valve chamber with slight clearance and arranged to contact with said seats, a release valve for the displacement valve, and actuating mechanism to unseat the displacement valve.

6. A high pressure flushing valve comprising a casing having an inlet and a relatively larger open bottom and outlet, a valve seat below the inlet, an enlargement and a

valve seat above the inlet, a hollow guide stem in the casing, a hollow main valve body fitted on the stem and nearly filling the casing between seats, a relief valve in said
5 main valve and means to open it, and the valve stem having a by-pass to the casing enlargement.

In testimony whereof I have hereunder signed my name in the presence of the two subscribed witnesses.

GEORGE A. BROWN.

Witnesses:

CHAS. S. LEPLEY,
F. W. H. CLAY.